

GRATIOLA BREVIFOLIA (PLANTAGINACEAE) NEW TO THE FLORA OF DELAWARE, THE DELMARVA PENINSULA, AND THE MID-ATLANTIC

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ABSTRACT

Gratiola brevifolia (Plantaginaceae) is reported as a rare and native addition to the flora of Delaware, the Delmarva Peninsula, and to the Mid-Atlantic. This species is disjunct approximately 835 km (520 mi) from the closest known population in Burke Co., Georgia.

RESUMEN

Gratiola brevifolia (Plantaginaceae) se cita como una especie native rara para añadir a la flora de Delaware, la Península de Delmarva, y as to the Mid-Atlantic. Esta especie está disyunta 835 km (520 mi) aproximadamente de la población conocida más cercana en Burke Co., Georgia.

The genus *Gratiola* L. (Plantaginaceae) consists of ca. 30 species (Estes, unpublished data) widely distributed through the North and South Temperate zones and on mountains within the Tropics (Pennell 1935). Six species of *Gratiola* (s.l.) have been reported on the Delmarva Peninsula (Tatnall 1946, McAvoy 2001), an area that lies entirely within the Atlantic Coastal Plain Physiographic Province of the eastern United States and consists of the Eastern Shores of Maryland and Virginia and the majority of the state of Delaware. The northern portion of Delaware lies within the Piedmont Physiographic Province (Plank & Schenck 1998). These six species are *G. aurea* Muhl., *G. neglecta* Torr., *G. pilosa* Michx., *G. ramosa* Walt., *G. virginiana* L., and *G. viscidula* Pennell. On Delmarva, *G. pilosa* and *G. virginiana* are considered to be common, *G. aurea* and *G. neglecta* infrequent, and *G. ramosa* and *G. viscidula* are thought to be historical, having not been reported for 20 or more years (McAvoy, pers. comm.). *Gratiola ramosa* was last collected from Wicomico Co., Maryland, near the town of Salisbury (Canby s.n. PH), and *G. viscidula* was last collected from New Castle Co., Delaware, near the city of Wilmington (Tatnall s.n. DOV; Commons s.n. DOV).

On 23 June 1992, Frank Hirst and Ron Wilson reportedly rediscovered *Gratiola ramosa* in Sussex Co, Delaware (R. Wilson 0719941, pers. herbarium). Recently, this population was visited by the first author and specimens were collected and sent to the second author for verification. Subsequently, the speci-

mens were determined not to be *G. ramosa* but instead were identified as *G. brevifolia* Raf., a species not previously reported from Delaware, the Delmarva Peninsula, or the Mid-Atlantic. Though *G. brevifolia* and *G. ramosa* are easily distinguished by the presence or absence of two bracteoles at the base of the calyx (Godfrey & Wooten 1981), Hirst and Wilson's misidentification could be expected because *G. brevifolia* is not included in any manual commonly used in the Mid-Atlantic (i.e., Fernald 1950; Radford et al 1968; Brown & Brown 1984; Gleason & Cronquist 1991).

Voucher Specimen: **U.S.A. DELAWARE. Sussex Co.:** Coastal Plain Physiographic Province, ditched portions of Tussocky Branch paralleling Piney Branch Rd., northwest of the town of Delmar, 29 Jul 2005, Knapp 1549 (DOV, TENN, Maryland Natural Heritage Program Herbarium).

Gratiola brevifolia is an erect perennial of wet, sandy pinelands (Pennell 1935), oak barrens (Tennessee), and sandy riverbanks (Arkansas and Oklahoma). The species ranges from Tennessee and Florida west to Oklahoma and Texas (Pennell 1935) and is found in four centers of distribution, with two occurring east and west of the Mississippi (Fig. 1). Eastward, *G. brevifolia* is centered on the Coastal Plain of northern Florida and southern Georgia with scattered populations west to southeastern Alabama. The species is also significantly disjunct to the Highland Rim and Cumberland Plateau of central Tennessee (Chester et al. 1997). To the west, *G. brevifolia* is most frequent in the West Gulf Coastal Plain of southeastern Texas and southwestern Louisiana, with disjunct populations in the West Gulf Coastal Plain of southeastern Oklahoma and the Ouachita Province of Oklahoma and Arkansas (Estes, unpublished data). Despite the broad geographic distribution, it is considered imperiled in Arkansas (NatureServe Explorer 2005) and probably should be considered a species of conservation concern in Alabama, Oklahoma, and Tennessee (Estes, unpublished data).

McAvoy (2001) listed *Gratiola ramosa* as a species of conservation concern for Delaware based upon the discovery and identification by Hirst and Wilson. With this publication, *G. ramosa* should no longer be considered a component of Delaware's native flora; however, it was historically a component of Delmarva's native flora based on Canby's collection cited above.

The population of *Gratiola brevifolia* in Delaware consists of ca. 1500 individuals restricted to the lower banks and bottoms of a ditched perennial stream. Interestingly, several other species in the vicinity of the *G. brevifolia* population are considered rare in Delaware, based on McAvoy (2003). These species include: *Amphicarpum purshii* Kunth, *Hypericum adpressum* Raf. ex W.Bart., *H. denticulatum* Walt., *Sabatia difformis* (L.) Druce, and *Utricularia radiata* Small.

The discovery of *Gratiola brevifolia* in Delaware marks a new addition to the flora of Delaware, the Delmarva Peninsula, and the Mid-Atlantic region, and is significantly disjunct from all other known populations in the Southeast. The closest population to the Delaware occurrence is ca. 835 km (520 mi)

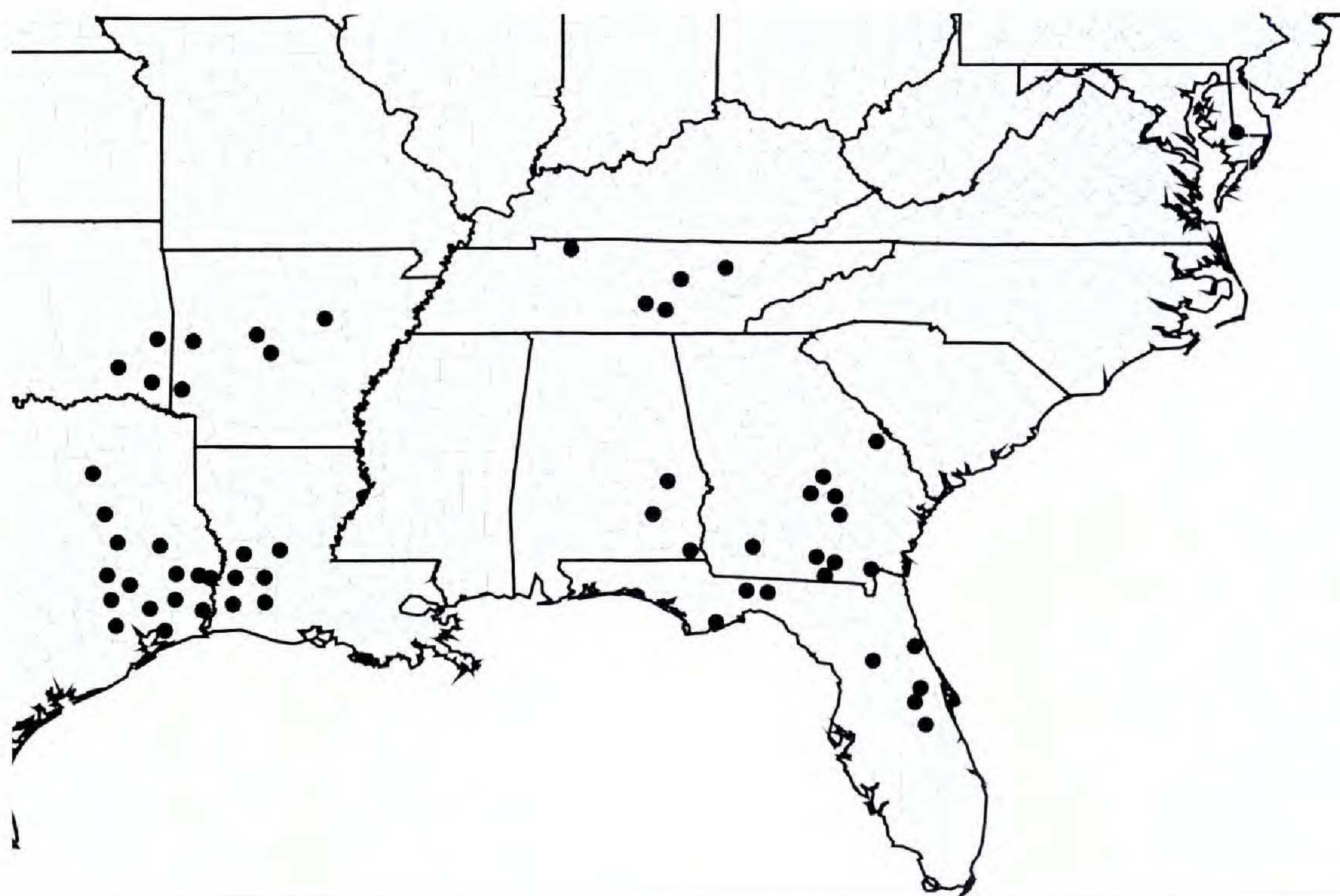


FIG. 1. Range of *Gratiola brevifolia*. Each ● represents a specimen examined.

to the southwest in Burke Co., Georgia (E.T. Wherry s.n. PH). Various sources have attributed South Carolina to the range of *G. brevifolia* (NatureServe Explorer 2005; South Carolina Plant Atlas 2005; USDA 2005; Weakley 2005), based upon specimens from Clarendon (J.F. Townsend 384 CLEMS), Lee (C.A. Aulbach-Smith 4070 and 4077 with S. Hutto USCH), and York counties (J.B. Nelson 8211 with L. Lundquist USCH), South Carolina, but these specimens, however, have been annotated by either Deborah Lewis or the second author as *G. ramosa* (Clarendon County) or *G. viscidula* (Lee and York counties).

The nativity of discoveries, such as this, are highly debatable, and entire papers have been devoted to the topic (Lamont & Young 2005). We consider *G. brevifolia* a native component of the flora of Delaware, the Delmarva, and the Mid-Atlantic region for several reasons. First, though the habitat supporting the species in Delaware is highly degraded, *G. brevifolia* is found in similar habitats in other portions of its range. Second, two other species of *Gratiola*, *G. ramosa* and *G. viscidula*, once reached their northern range limits on the Delmarva Peninsula. The historic Maryland population of *G. ramosa* was also significantly disjunct, ca. 500 km (300 mi), from its closest known occurrence in Hoke Co., North Carolina (Radford et al. 1968). Third, the genus *Gratiola* is known for having strange and highly disjunct distributional patterns. For instance, De Lange (1997) reported *G. pedunculata* R.Br. as a new addition to the

flora of New Zealand and considered the species to be a recent natural migrant likely distributed by vagrant birds from mainland Australia, a disjunction of ca. 2150 km (1332 mi). Furthermore, *G. virginiana*, a species primarily distributed in the southeastern United States, is disjunct to the states of Veracruz and Puebla, Mexico from central Texas, a distance of more than 900 km (525 mi) where it occurs in association with other species characteristic of the temperate southeastern United States (Miranda & Sharp 1950). Even *G. brevifolia* has a fragmented range characterized by wide disjunctions. For example, on the Gulf Coastal Plain, the easternmost population of *G. brevifolia* west of the Mississippi River in Rapides Parish, Louisiana is separated by ca. 623 km (387 mi) from the westernmost population east of the Mississippi River in Pike Co., Alabama. Lastly, *G. brevifolia* is not known to be cultivated or grown for horticultural purposes; therefore, it is highly unlikely that this species would have been introduced from nearby cultivated plants.

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